

REMARKS

I. Introduction

Claims 1 to 20 are pending in the present application. In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

II. Rejection of Claims 1 to 20 Under 35 U.S.C. § 103(a)

Claims 1 to 20 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,176,122 ("Ito") in view of "Triac Control using the COP400 Microcontroller Family," National Semiconductor's COP, Note 6, February 1981 ("Note 6"). Applicants respectfully submit that the combination of Ito and Note 6 does not render obvious the claims for the following reasons.

Claims 1 and 11 recite a bank selection switch including a triac and a triac drive circuit configured to drive the triac. Claims 1 and 11 further recite that the triac is adapted to selectively charge and discharge the piezoelectric element. Claim 7 and 17 recite driving a triac drive circuit to drive a triac to selectively charge and discharge the piezoelectric element.

Ito purports to relate to a fuel injection device for an internal combustion engine having a fuel injector. See Abstract. Each fuel injector 5 is stated to be connected to the output port 26 via corresponding drive circuits 34. See col. 3, lines 42 to 45. When a charge is given to piezoelectric element 46 to stop fuel injection, the piezoelectric element 46 is stated to expand axially. See col. 3, lines 59 to 62. When the charge of the piezoelectric element 46 is discharged to start the fuel injection, the piezoelectric element 46 is stated to be contracted. See col. 4, lines 1 to 3.

Note 6 purports to describe details regarding the COP400 single-chip controller family members. See Note 6, paragraph 1.0. This is supported by all the paragraph headings,

including "1.0 Triac Control", "2.0 Software Techniques" and "3.0 Triac Light Intensity Control Code".

Nowhere does the combination of Ito and Note 6 disclose, or even suggest, a bank selection switch including a triac and a triac drive circuit configured to drive the triac, as recited in claims 1 and 11. Further, nowhere does the combination of Ito and Note 6 disclose driving a triac drive circuit to drive a triac to selectively charge and discharge the piezoelectric element, as recited in claims 7 and 17. Ito does not provide any details of drive circuit 34 or output port 26, i.e., construction, configuration, specifications, etc. Indeed, nowhere in Ito, other than the introductions noted above, is there any discussion of either drive circuit 34 or output port 26. Rather, Ito merely states at col. 3, lines 42 to 45 that "[e]ach fuel injector 5 is connected to the output port 26 via corresponding drive circuits 34 and the high pressure fuel pump 8 is connected to the output port 26 via a drive circuit 36." Ito does not indicate whether the drive circuit includes a switch, let alone a triac and a triac drive circuit.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). As established above, the combination of Ito and Note 6 does not disclose, or even suggest, all of the limitations of amended claims 1, 7, 11 and 17. Nor is there any suggestion or motivation to modify or combine the disclosures of Ito and Note 6 in the manner contemplated by claims 1, 7, 11 and 17. There is no discussion in Note 6 to use the triac in conjunction with a triac drive circuit in connection with a fuel injector element, and there is no discussion in Ito of a triac, or any switch at all, in conjunction with a piezoelectric element.

Accordingly, there is no evidence that the references relied upon, whether taken alone, combined or modified, would

provide the features and benefits of claims 1, 7, 11 and 17. It is therefore respectfully submitted that claims 1, 7, 11 and 17 are allowable for these reasons.

The Office Action alleges that Ito discloses "an apparatus (20) for driving fuel injector elements (5) divided into a plurality of injector banks (Figure 1), each bank containing at least one piezoelectric element (46), each bank being selected for charging or discharging by a **bank-selection switch (26)**." Office Action at p. 2, par. 3 (emphasis added). However, Applicants find no indication in Ito that output port (26), referenced by reference number 26 throughout Ito, is a bank-selection switch, as opposed to a port, as its name indicates. Further, in direct contradiction to the above allegation, the Office Action admits that Ito does not disclose a bank selection switch which includes a triac with a triac drive circuit. Office Action at p. 2, par. 3.

The Office Action further alleges that the test for obviousness is not (a) whether the features of the secondary reference may be bodily incorporated into the structure of the primary reference, or (b) that the claimed invention be expressly suggested in any one or all of the references. Office Action at p. 5. Rather, the Office Action alleges that the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. It is clear from the above arguments that the combination of Ito and Note 6 would not have suggested to one of ordinary skill in the art at the time the apparatus and method recited in claims 1, 7, 11 and 17 were made the use of a triac with the fuel injection device of Ito. Simply stated, Ito does not disclose any detail regarding the make-up of drive circuit 34, let alone use of a triac and triac driver, and Note 6 does not disclose, or even suggest, a triac in combination with a fuel injection device.

In response to Applicants' assertion that the combination of Ito and Note 6 does not disclose that the triac drive circuit is configured to drive the triac and that the triac is adapted is adapted to selectively charge and discharge the piezoelectric element, the Office Action alleges only that a "recitation of the intended use of the claimed invention must

result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art." Office Action at p. 5, par. 13. Applicants respectfully submit that claims 1, 7, 11 and 17 positively recite a bank selection switch including a triac and a triac drive configured to drive the triac. As indicated above, nowhere does Ito disclose, or even suggest, that the drive circuit includes a bank selection switch including a triac and a triac drive configured to drive the triac.

The Office Action's reliance on In re Hutchison, 69 U.S.P.Q. 138 (C.C.P.A. 1946) is misplaced. In this regard, the Office Action states that "[i]t has been held that the recitation that an element is 'adapted to' or 'configured to' perform a function is not a positive limitation but only requires the ability to so perform" and that "[i]t does not constitute a limitation in any patentable sense." Office Action at p. 3. As an initial matter, In re Hutchison did not involve claims that included "configured to" language. Accordingly, the statement "[i]t has been held that the recitation that an element is . . . 'configured to' perform a function is not a positive limitation but only requires the ability to so perform" is not supported by the decision of In re Hutchison. Furthermore, the "adapted to" language in the claims at issue in the decision of In re Hutchison appeared in the introductory clause. Furthermore, in the more recent case of In re Venezia, 530 F.2d 956, 189 U.S.P.Q. 149 (C.C.P.A. 1976), it was found that "a pair of sleeves . . . each sleeve of said pair adapted to be fitted over the insulating jacket of one of said cables" imparts a structural limitation to the sleeve -- each sleeve is so structured or dimensioned that it can be fitted over the insulating jacket of a cable. In re Venezia, 530 F.2d at 959. Similar situations were found to exist with respect to "adapted to be affixed" and "adapted to be positioned" limitations. Id.

Regarding motivation to combine Ito and Note 6, the Office Action only alleges that "the COP400 Microcontroller Family was designed and developed to be used with a wide variety of compatible electronic systems." Office Action at p. 5, par. 10. It is respectfully submitted that the cases of In re

Fine, supra, and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that the Office Action's generalized assertion that it would have been obvious to modify or combine Ito and Note 6 because "the COP400 Microcontroller Family was designed and developed to be used with a wide variety of compatible electronic systems," does not properly support a § 103 rejection. It is respectfully submitted that those cases make plain that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect the proper evidence to support an obviousness rejection based on the reference relied upon. In particular, the Court in the case of In re Fine stated that:

The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. This it has not done. . . .

Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added). Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . . Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].

In re Jones, 21 U.S.P.Q.2d at 1943, 1944 (citations omitted; italics in original).

That is exactly the case here since it is believed and respectfully submitted that the present Office Action offers no evidence whatsoever, but only conclusory hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding. The Office Action alleges, without support, that it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the teachings of Ito to include a triac, as taught by Note 6, for the "purpose of providing the computational ability and speed to intelligently manage power in this particular electrical situation." See Office Action at p. 3. Nowhere does either reference suggest a motivation for use of a switch in a drive circuit, let alone a triac for driving a piezoelectric element. Unsupported assertions are not evidence as to why a person having ordinary skill in the art would be motivated to modify or combine a reference to provide the claimed subject matter of the claims to address the problems met thereby. Accordingly, the Office must provide proper evidence of a motivation, outside of Applicants' application, for modifying or combining Ito and Note 6 to provide the claimed subject matter.

The Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not the case here -- there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed," stating that:

In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific

understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed. In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper prima facie case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Fed. Cir. 2000) (emphasis added). Again, it is believed that there have been no such findings. Therefore, withdrawal of the 35 U.S.C. § 103(a) rejection and allowance of claims 1, 7, 11 and 17 is respectfully requested.

As further regards claims 7 to 10 and 17 to 20, the Office Action alleges that "developing an appropriate method for driving the claimed piezoelectric fuel injector elements is necessary, and inherently obvious, to properly use the claimed invention." Office Action at p. 3. This statement is not only not understood but also fails to establish that the combination of Ito and Note 6 would render unpatentable claims 7 and 17.

As for claims 2 to 6, which ultimately depend from claim 1 and therefore include all of the limitations of claim 1, claims 8 to 10, which ultimately depend from claim 7 and therefore include all of the limitations of claim 7, claims 12 to 16, which ultimately depend from claim 11 and therefore include all of the limitations of claim 11, and claims 18 to 20, which ultimately depend from claim 17 and therefore include all of the limitations of claim 17, it is respectfully submitted that the combination of Ito and Note 6 does not render obvious these dependent claims for at least the same reasons given above in support of the patentability of claims 1, 7, 11 and 17. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1998) (any dependent claim depending from a non-obvious independent claim is non-obvious).

Further in regard to claims 2 to 6, Applicants submit the following additional reasons in support of patentability. Nowhere does the combination of Ito and Note 6 disclose, or even suggest, the injector bank shut down when the triac drive circuit

is not driven, as recited in claim 2. Further, nowhere does the combination of Ito and Note 6 disclose, or even suggest, that the triac is driven by two transistors, as recited in claim 3, let alone where one is a npn transistor and the other is a pnp transistor, as recited in claim 4. Further, nowhere does the combination of Ito and Note 6 disclose, or even suggest, a main switch low side provided for stopping a charging or discharging current when an error occurs, as recited in claim 5, or a main switch that is at least one of a MOSFET and an IGBT with reverse diode, as recited in claim 6.

In summary, Applicant submits that the combination of Ito and Note 6 does not render obvious claims 1 to 20. Therefore, withdrawal of the 35 U.S.C. §103(a) rejection and allowance of claims 1 to 20 is respectfully requested.

III. Conclusion

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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